

### Claims

1           1.    A time domain radio transmission system comprising:  
2                a radio transmitter comprising:  
3                    pulse generating means for generating a series of  
4                pulses spaced by time,  
5                    a broadband transmitting antenna comprising a pair  
6                of generally triangularly contoured, when measured in a plane,  
7                elements, and wherein bases of the pair are parallel and  
8                adjacent,  
9                    a source of D.C. power, and  
10                switching means responsive to said pulse  
11                generating means and coupled to said source of D.C. power and  
12                connected across and between said closely adjacent bases of said  
13                antenna for switching power between states of applied power and  
14                no applied power to said transmitting antenna, and thereby  
15                generating a series of time space positioned, A.C. carrierless  
16                burst signals, and transmitting them into free space;  
17                a radio receiver comprising:  
18                    a receiving antenna comprising a pair of generally  
19                triangular contoured, when measured in a plane, elements, and  
20                wherein bases of the pair are closely adjacent, and a received  
21                signal being available across said bases, and  
22                    detection signal generating means responsive to  
23                timing signals for generating a detection signal;  
24                timing means for deriving and supplying said timing signals  
25                to said detection signal generation means as a function of the  
26                time of occurrence of transmission of said A.C. carrierless burst  
27                signals;

28 signal mixing and integration means responsive to signals  
29 from across said bases of said receiving antenna and said  
30 detection signals for providing an output which is a function of  
31 a discrete relation between said detection signals and received  
32 signals; and

33 indication means for indicating said output.

1 2. A system as set forth in claim 1 wherein said  
2 switching means comprises:

3 a layer of normally high-resistive but light-responsive,  
4 low-resistance material;

5 a pair of spaced electrodes on and coupled to said bases of  
6 said transmitting antenna; and

7 trigger means comprising light source means responsive to  
8 said pulse generating means for applying a discrete increment of  
9 light to said layer of material of a character wherein said  
10 material transitions from a non-conductive to a conductive state  
11 between said electrodes.

1 3. A system as set forth in claim 2 wherein said switching  
2 means is positioned adjacent said transmitting antenna.

1 4. A system as set forth in claim 2 wherein:

2 said switching means is positioned adjacent said bases of  
3 said transmitting antenna; and

4 said system includes light tube means for coupling light  
5 from said trigger means to said material of said switching means.

1 5. A system as set forth in claim 2 wherein said material  
2 is diamond.

1 6. A system as set forth in claim 1 wherein said pulses  
2 generated by said pulse generating means are irregular in time

3 spacing.

1 7. A system as set forth in claim 6 wherein the spacings  
2 of said pulses are at irregularly spaced time intervals.

1 8. A system as set forth in claim 1 wherein said timing  
2 means is responsive to said series of pulses of said pulse  
3 generating means.

1 9. A time domain radar system comprising:

2 broadband antenna means including a pair of terminals for  
3 coupling radio signals between space and said pair of terminals;  
4 a radio transmitter comprising:

5 pulse generating means for generating a series of  
6 pulses at irregular times,

7 a source of D.C. power, and

8 switching means responsive to said pulse  
9 generating means and coupled to said source of D.C. power and  
10 connectable to said pair of terminals of said broadband antenna  
11 means for switching between states of applied power and no  
12 applied power to said antenna means whereby varingly-spaced, A.C.  
13 carrierless burst signals are transmitted into space;

14 a radio receiver comprising:

15 radio receiving means coupled to said broadband  
16 antenna means for receiving return signals appearing at an  
17 elapsed time following signal transmissions, which elapsed time  
18 is the time of transmission of an A.C. carrierless burst signal  
19 from said broadband antenna means to a target at a selected  
20 distance plus return time back to said broadband antenna means,

21 detection signal generating means responsive to  
22 timing signals for generating a detection signal,

23 timing means responsive to the time of  
24 transmission of a set of burst signals for generating, as a set,  
25 said timing signals, each of a said set being of a like said  
26 elapsed time, and coupling said timing signals to said detection  
27 signal generation means, and

28 signal mixing and integration means responsive to  
29 a set of return signals from said broadband antenna means and a  
30 set of detection signals responsive to a said set of timing  
31 signals for providing a discrete output signal which is a  
32 function of the time identity between a said set of received  
33 return signals and detection signals;

34 bandpass filter means responsive to said signal mixing and  
35 integration means for providing a signal output responsive to a  
36 selected range of frequencies; and

37 indication means responsive to the output of said bandpass  
38 filter means for indicating the presence of a target moving  
39 within a selected range of velocities and at a selected range.

1 10. A system as set forth in claim 9 wherein said antenna  
2 means comprises at least one antenna, in turn comprising at least  
3 one pair of generally triangularly contoured, when considered in  
4 a plane, elements, and wherein bases of the pair are closely  
5 adjacent.

1 11. A system as set forth in claim 10 wherein said antenna  
2 means comprises a transmitting antenna coupled to said switching  
3 means and a receiving antenna coupled to said radio receiving  
4 means, and each of said antennas comprises at least one pair of  
5 generally triangularly contoured, when considered in a plane,  
6 elements, and wherein triangular bases of the pair are closely

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7 adjacent.

1 12. A wideband electromagnetic system comprising:  
2 generating means for generating stepped wave signals;  
3 transmitting means responsive to said stepped wave signals  
4 for transmitting wideband burst signals;  
5 a wideband antenna coupled to a medium through which said  
6 burst signals propagate, and said wideband antenna comprising at  
7 least one dipole in turn comprising two ele each element  
8 characterized by having a broad base and narrow apex, and wherein  
9 the bases are parallel and adjacent; and  
10 receiving means including coupling means connected across  
11 said elements of said wideband antenna for detecting signals  
12 derived from said burst signals.

1 13. A system as set forth in claim 12 wherein said  
2 receiving means comprises coherent detection means responsive to  
3 times of initiation of said burst signals for coherently  
4 detecting said signals and, separately, integrating a plurality  
5 of coherently detected signals and thereby indicating the  
6 existence of a target.

1 14. A system as set forth in claim 12 wherein said coupling  
2 is to the bases of said antenna elements.

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1 15. A wideband transmission system comprising:  
2 generating means for generating generally stepped wave  
3 signals;  
4 transmitting means including a broad frequency band radiator  
5 and, responsive to said stepped wave signals, for transmitting  
6 wideband burst signals into a selected medium; and  
7 receiving means responsive to signals derived from

8 transmitted said burst signals and to times of initiation of said  
9 burst signals for coherently detecting said burst signals and,  
10 separately, integrating a plurality of coherently detected  
11 signals and thereby deriving an intelligence signal.

1 ~~16.2~~<sup>2</sup> A system as set forth in claim ~~15~~<sup>11</sup> wherein said system  
2 includes reciprocal electrical-signal-to-sonic translation means  
3 and said last-named means includes said broad frequency band  
4 radiator, and said receiving means includes signal means  
5 responsive to said reciprocal electrical-signal-to-sonic  
6 translation means and to said times of initiation of said burst  
7 signals for coherently detecting said signals.

1 ~~17.4~~<sup>2</sup> A system as set forth in claim ~~15~~<sup>11</sup> wherein said medium  
2 is a liquid.

1 ~~18.7~~<sup>2</sup> A system as set forth in claim ~~16~~<sup>2</sup> wherein said medium  
2 is a liquid.

1 ~~19.5~~<sup>5</sup> A system as set forth in claim ~~16~~<sup>1</sup> wherein said broad  
2 frequency band radiator comprises a broadband light radiator.

1 ~~20.6~~<sup>5</sup> A system as set forth in claim ~~19~~<sup>5</sup> wherein said  
2 broadband-frequency <sup>band</sup> radiator comprises:

3 a laser;

4 a light modulator comprising:

5 an elongated optical channel having an entrance  
6 end for receiving light from said laser and a light exiting end  
7 and having a refractive index variable by an electrical field,  
8 and

9 conductive means extending along said optical  
10 channel for applying an electrical field to said optical channel;  
11 signal means for generating a generally ramp-shaped voltage

12 and applying said voltage to said conductive means generally in  
13 the region of said exiting end of said channel; and  
14 a dispersive medium disposed to intercept the output of said  
15 channel and emit a responsive beam which is characterized by a  
16 broad spectrum of light.

1 21. A light modulation system comprising:  
2 a source of narrow band light;  
3 an elongated optical channel having an entrance end for  
4 receiving light from said source and an exiting end and having a  
5 refractive index variable by an electrical field;  
6 conductive means extending along said optical channel for  
7 applying an electrical field across said optical channel; and  
8 signal means for generating a modulation signal and applying  
9 said signal to said conductive means in a region adjacent said  
10 exiting end of said optical channel and thereby creating said  
11 electrical field therein;  
12 whereby light from said light source passing from said  
13 entrance end to said exit end of said optical channel is affected  
14 by said electrical field; whereby the frequency of light passing  
15 through said optical channel is varied in frequency as a function  
16 of said signal.

1 22. A system as set forth in claim 21 wherein said  
2 conductive means comprises first and second elongated conductors  
3 positioned on opposite sides of said optical channel.

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B 5